

## **Scintillating Quantum Dots for Imaging X-rays (SQDIX) for Aircraft Inspection**

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### **Purpose:**

Scintillation is the process currently employed by state-of-the-art x-ray detectors to create x-ray images. Scintillating quantum dots or nano-crystals (StQDs) are a novel, nanometer-scale material that upon excitation by x-rays, re-emit the absorbed energy as visible light. StQDs have higher output than conventional scintillating materials. We propose the novel application of StQDs in a concept feasibility demonstration to produce an x-ray imaging detector based on this novel material. The SQDIX system concept is a revolutionary system that enables characterization of microcracking in composites or x-ray inspection of in-service turbine engines improving aircraft safety and sustainability. The proposed work directly addresses the Aviation Safety R&D challenge “Develop technologies to reduce accidents and incidents through enhanced vehicle design, structure, and subsystems”.

### **Background**

Development of SQDIX system will be a revolutionary step in x-ray imaging technology. StQDs based detectors allow for the use of visible light cameras and optics to create x-ray images [1-3]. High efficiency conversion factor of StQDs, SQDIX will create x-ray detectors that are more sensitive than current x-ray detectors. In addition to an increase in sensitivity, the large commercial availability of visible light-based cameras will greatly reduce the cost (at least by a factor of 10x) to produce x-ray detectors of this type. StQDs are ideal for solution processing or modifying through polymers to form composite materials that can be embedded in structures. These innovations when successfully implemented have a wide range of applications across many fields that use x-rays for imaging, including but not limited to aircraft inspection, computed tomography, high-energy physics, spectrometry, medical imaging, security (X-Ray Luggage Scanning) and x-ray telescopes.